Surveys
(FIC in PNW)
SPR 3Q-1

FOREST INSECT CONDITIONS

in the Pacific Northwest during 1962

by

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INSECT AND DISEASE CONTROL BRANCH
DIVISION OF TIMBER MANAGEMENT
PACIFIC NORTHWEST REGION
U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

JUNE 1963

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This is the 15th annual report of forest insect conditions in Oregon and Washington. It is based on cooperative surveys sponsored by the Northwest Forest Pest Action Council. The combined efforts of many organizations and individuals have made these surveys possible. Special acknowledgement is made to the principal cooperators: Oregon State Department of Forestry and Washington State Department of Natural Resources.

COVER BACKGROUND: Egg gallery and larval mines of the Douglas-fir beetle, Dendroctonus pseudotsugae Hopk., on the bark of Douglas-fir.

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Pacific Northwest Region — U.S. Forest Service

U. S. Department of Agriculture

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SURVEY FINDINGS IN BRIEF

Epidemic insect outbreaks in Oregon and Washington totaled 1,307,750 acres this year (table 1). The extent and intensity of the outbreaks by insect species are given in the Appendix in table 24 for Oregon and in table 25 for Washington. The general locations of the most extensive outbreaks are shown in figure 1 in the Appendix.

The principal findings of the 1962 survey were:

1. Mountain pine beetle.--Outbreaks decreased considerably in western white pine stands along the Cascade Range in Oregon and increased significantly in Washington. Killing in lodgepole pine and stagnated young ponderosa pine stands decreased in Oregon and remained static in Washington.

2. Western pine beetle.--Losses continued to decline in Washington pine forests but heavier and more extensive mortality occurred on southern and eastern Oregon forests.

3. Douglas-fir beetle.--Outbreaks declined in both States. Remaining centers of activity were on the Okanogan and Colville National Forests and the Colville Indian Reservation in Washington and on the Wallowa-Whitman National Forest in Oregon.

4. Fir engraver.--The acreage of epidemic outbreaks in true fir stands tripled this year in Oregon and remained static in Washington.

5. Oregon pine ips.--The acreage of outbreaks in young ponderosa pine stands tripled in Oregon and decreased considerably in Washington.

6. Spruce budworm.--Outbreaks in southern Oregon decreased in size and intensity. Light to moderate defoliation reappeared in northeast Oregon. No epidemic infestations occurred in Washington.

7. Western hemlock looper.--Critical defoliation occurred in localized areas in Pacific and Wahkiakum Counties in southwestern Washington. Some tree mortality has occurred, more is expected in 1963. Control will be needed in 1963 to protect timber values.

8. Windthrown timber.--Severe winds of the October 12, 1962 storm and subsequent winter storms left vast amounts of windthrown timber in the woods. Beetles emerging from this material may cause a serious threat to surrounding green timber in 1964. Immediate salvage is recommended.

Table 1.--Summary of 1962 forest insect epidemic infestations in Oregon and Washington

Insects 1/ 2/	Oregon		Washington		Regional total	
	Infestation centers	Area	Infestation centers	Area	Infestation centers	Area
	Number	Acres	Number	Acres	Number	Acres
Defoliators:						
Spruce budworm	14	48,370	0	0	14	48,370
Douglas-fir needle gall midge	8	14,570	0	0	8	14,570
Larch casebearer	0	0	2	5,280	2	5,280
Lodgepole sawfly	2	4,800	0	0	2	4,800
Western hemlock looper	14	1,060	14	5,990	28	7,050
Pine needle sheath miner (P)	3	4,000	0	0	3	4,000
Pine needle sheath miner (L)	0	0	1	1,440	1	1,440
Ponderosa pine sawfly	4	1,080	3	320	7	1,400
Oak looper	5	1,240	0	0	5	1,240
Unknown sawfly (larch)	3	170	0	0	3	170
Douglas-fir tussock moth	0	0	2	100	2	100
All defoliators	53	75,290	22	13,130	75	88,420
Sucking insects:						
Balsam woolly aphid	106	51,800	20	4,710	126	56,510
Pine needle scale	6	1,920	0	0	6	1,920
All sucking insects	112	53,720	20	4,710	132	58,430
Bark beetles:						
Mountain pine beetle (W)	224	73,720	419	349,770	643	423,490
Mountain pine beetle (L)	147	65,200	13	3,050	160	68,250
Mountain pine beetle (P)	20	3,820	15	1,345	35	5,165
Mountain pine beetle (S)	1	160	0	0	1	160
Western pine beetle	465	392,385	14	6,380	479	398,765
Douglas-fir beetle	144	26,540	240	55,990	384	82,530
Fir engraver	294	105,450	58	22,820	352	128,270
Oregon pine ips	311	43,610	55	1,970	366	45,580
Engelmann spruce beetle	10	1,230	26	6,280	36	7,510
Douglas-fir engraver	1	160	6	540	7	700
Silver fir beetles	1	480	0	0	1	480
All bark beetles	1,618	712,755	846	448,145	2,464	1,160,900
All insects	1,783	841,765	888	465,985	2,671	1,307,750

1/ Mountain pine beetle infestations are separated by tree species: L, lodgepole pine; P, ponderosa pine; S, sugar pine; W, western white pine.

2/ Pine needle sheath miner infestations are separated by tree species: P, ponderosa pine; L, lodgepole pine.

INTRODUCTION

Survey procedures were the same as those used in recent years. Epidemic outbreaks were detected and mapped by intensity from the air by standard methods.[1/] The intensity of ground surveys varied from the time-consuming evaluation of spruce budworm and western hemlock looper egg populations to general checking to verify the accuracy of aerial mapping.

DEFOLIATORS

SPRUCE BUDWORM
Choristoneura fumiferana (Clem.)

Outbreaks of the spruce budworm decreased since last year. The decrease was due in part to a 44,550 acre control project in southern Washington and the action of natural control factors in other areas.

In Oregon, outbreaks on the Fremont National Forest decreased both in size and intensity. Epidemics on the Wallowa-Whitman National Forest in northeastern Oregon, reappeared after a year's absence. No epidemic populations were detected in Washington although some subepidemic feeding was found outside the 1962 control area. The trend of epidemic infestations during 1962 and 1962 are as follows:

Administrative area	1961		1962	
	Acres	Percent	Acres	Percent
Oregon:				
Fremont N.F.	55,200	65	42,060	87
Wallowa-Whitman N.F.	0	0	6,310	13
Oregon areas	55,200	65	48,370	100
Washington:				
Glenwood District	22,400	26	0	0
Yakima Indian Reservation	7,200	9	0	0
Washington areas	29,600	35	0	0
All areas	84,800	100	48,370	100

1/ Wear, J. F., and W. J. Buckhorn, Organization and conduct of forest insect aerial surveys in Oregon and Washington. U.S. Forest Service Pacific Northwest Forest and Range Experiment Station, 40 pp., illus. 1955. (Processed)

The most extensive remaining outbreaks are located in mixed conifer stands in the vicinity of Gearhart Mountain on the Fremont National Forest in Oregon (table 2).

The 1962 egg mass evaluation survey showed that the population trend was variable on the Fremont National Forest and upward on the Wallowa-Whitman National Forest.2/ Control is not needed on either infestation area in 1963.

The 1962 spruce budworm control project in Yakima and Kittitas Counties, Washington was successful. The feeding population was reduced by 99.2 percent and the current year's foliage was saved.

2/ Buffam, Paul E., Evaluation of 1962-63 spruce budworm populations in Oregon and Washington. U.S. Forest Service, 4 pp., (Processed) October 9, 1962.

Table 2.--Extent of spruce budworm infestations in Oregon in 1962, by administrative area, control unit and intensity of infestation

(In acres)

Administrative area 1/ and control unit	Intensity of infestation: Light	Moderate	Heavy	All Intensities
Oregon:				
Fremont N.F.				
Gearhart Mountain	28,160	1,920	0	30,080
Warner Mountain	10,700	1,280	0	11,980
Total	38,860	3,200	0	42,060
Wallowa-Whitman N.F.				
Snake	4,670	1,640	0	6,310
Total All Units	43,530	4,840	0	48,370

1/ N.F., National Forest

DOUGLAS-FIR NEEDLE GALL MIDGE
Contarinia Sp.

In Oregon, this midge caused very light to rather severe defoliation of Douglas-fir near Sparta, on the Wallowa-Whitman and in the Canyon Creek drainage on the Malheur National Forest. It is not known whether the needle damage caused by this midge will have any lasting effects on the trees. Where the young trees were destined for the Christmas tree market, values were seriously impaired. The trend of the infestation is unknown. No practical control has been developed for use under forest conditions.

LARCH CASEBEARER
Coleophora laricella (Hübner)

Epidemic outbreaks of the larch casebearer increased considerably this year in the vicinity of Mica Peak near Spokane, Washington. Light subepidemic numbers of the insect were found from the Idaho line westward to Deer Park, Springdale, and Chewelah, Washington. This infestation appears to have all the aspects of a biological explosion that sometimes occurs when a foreign insect is introduced to a new area and released from its controlling factors.

Control can be obtained by aerial spraying. Tests in Idaho in 1962 indicate that malathion applied at the rate of ½ pound in 1 gallon of No. 1 fuel oil per acre produced 90 percent larval mortality. However, there has been no tree mortality in the infested areas so far, and control is not contemplated for 1963.

LODGEPOLE PINE SAWFLY
Neodiprion sp.

Moderate to severe defoliation of lodgepole pine and intermingled knobcone pine and ponderosa pine occurred near Thorn Prairie on the Umpqua National Forest. Outbreaks of sawflies generally are brought under control by natural factors within a season or two. No control is contemplated for 1963, but the trend of the infestation will be closely followed.

WESTERN HEMLOCK LOOPER
Lambdina fiscellaria lugubrosa Hulst

Critical defoliation occurred in mature western hemlock stands in the vicinity of Naselle, Washington and on Long Island in Willapa Bay. In Oregon, surviving larval populations within the 1962 spray area in Clatsop County caused considerable defoliation in localized areas. In these areas where heavy defoliation occurred in 1962, some trees have already been killed and much valuable timber is threatened. Biological evaluation surveys of the looper egg populations showed that a high larval feeding population is likely in 1963.[3/] Hence, the Northwest Forest Pest Action Council recommended that control be undertaken in 1963 to protect timber values.

A total of about 70,000 acres of infestation in Pacific and Wahkiakum Counties, Washington will be sprayed operationally with Sevin on areas draining into Willapa Bay and with DDT on areas draining into the Columbia River. Pilot tests will be made of the effectiveness of Phosphamidon and *Bacillus thuringiensis* in controlling western hemlock looper populations. Every precaution will be taken during the project to protect valuable fish, shellfish and wildlife values in the area.

In Clatsop County, Oregon, 32,500 acres were sprayed to control looper damage in 1962. DDT in fuel oil was applied at the rate of ½ pound of insecticide in 1½ gallons of fuel oil per acre. The resulting larval mortality of 88 percent was considered satisfactory since the

3/ Buffam, Paul E., Results of the 1963 western hemlock looper survey in southwest Washington, U.S. Forest Service 21 pp. (Processed), May 1963.

objective was to save the current year's foliage rather than to strive for complete control. The surviving larval population may cause defoliation and some additional tree mortality in northwest Oregon in 1963.[4/]

The extent of epidemic infestations of the western hemlock looper in 1962 is as follows:

Administrative and Control Unit	Intensity of infestation: Light	Moderate	Heavy	Very Heavy	All Intensities
	Acres				
Oregon:					
Northwest Oregon	110	340	610	0	1,060
Washington:					
Southwest Washington	2,710	1,300	1,660	320	5,990
Total All Units	2,820	1,640	2,270	320	7,050

PINE NEEDLE-SHEATH MINER
Zellaria haimbachi Busck

The acreage of epidemic defoliation caused by this moth increased in 1962. New centers of damage developed in young ponderosa pine stands near Ashland, Oregon. Lighter defoliation continued in the older center of damage in lodgepole pine near Tumwater, Washington. Widely scattered subepidemic damage occurred on both pine species in many other areas in Oregon and Washington. Larval and pupal parasites are fairly abundant in most areas. This insect is not known to cause any tree mortality; hence, control is not needed in 1963.

PONDEROSA PINE SAWFLY
Neodiprion sp.

Young ponderosa pine in the Touchet River, Tucannon River and Robinson Creek drainages on the Umatilla National Forest in Washington and in the Squaw Creek drainage on the Umatilla Indian Reservation in Oregon was lightly to heavily defoliated by a species of *Neodiprion*. Parasitism was fairly heavy in both areas. No control is planned for 1963.

4/ Buffam, Paul E., Results of the 1963 western hemlock looper egg survey in northwest Oregon, U.S. Forest Service, 4 pp. (Processed), May 1963.

WESTERN OAK LOOPER
Lambdina fiscellaria somniaria (Hulst)

Old outbreaks on Oregon white oak near Dallas and Monmouth, Oregon subsided. New infestations developed near Wren and Salt Creek, Oregon and in other widely separated locations in the Willamette Valley. Epidemic outbreaks of this insect generally subside without causing lasting damage to the stand. Hence, control is unnecessary under forest conditions.

UNKNOWN SAWFLY ON LARCH

Defoliation in two small stands of western larch in the Lostine River drainage on the Wallowa-Whitman National Forest in Oregon ranged from moderate to severe. Larch will tolerate some defoliation for a few seasons without any lasting stand damage. No control is needed in 1963.

DOUGLAS-FIR TUSSOCK MOTH
Hemerocampa pseudotsugata McD.

Two small epidemic outbreaks of this defoliator occurred in farm woodlots near Colbert and Spokane, Washington. In both locations, Douglas-fir was attacked and severely defoliated. Some trees were killed and others will likely die in 1963. These infestations pose a threat to the surrounding stands because the young larvae are buoyant and can be carried long distances by the wind. Also, the egg masses may be transported from place to place on lumber, farm vehicles and by other means.

EUROPEAN PINE SHOOT MOTH
Rhyacionia buoliana (Schiff.)

Early in 1962 the European pine shoot moth was discovered in native lodgepole pine stands near Shelton, Washington. About the same time, the moth was found on ornamentals in Bellingham, Washington. Because of these discoveries, the Northwest Forest Pest Action Council recommended that a containment zone be established in northwestern Washington. Within this zone no eradication would be attempted, but voluntary control would be encouraged. Outside the containment zone, eradication of infested trees is necessary.

In 1962, about 176 communities in Washington and 100 in Oregon were surveyed for the European pine shoot moth on native and ornamental pines. Again in 1962, eradication surveys in Spokane, Washington found no infestations. Several infested pines found in Portland, Oregon were destroyed. One new infestation was found and eradicated at Aberdeen, Washington. This infestation was due to movement of infested pine stock from Seattle in violation of quarantines.

Surveys of both ornamental and native pines will be continued in 1963. Eradication surveys will be made in Spokane, Washington and Portland, Oregon.

SUCKING INSECTS

BALSAM WOOLLY APHID
Chermes piceae (Ratz.)

The acreage of true fir stands infested by this insect decreased slightly in Oregon and Increased slightly in Washington (table 3). The majority of the damage occurred in subalpine fir stands on the Willamette National Forest in Oregon. Several subalpine firs in the Muir Creek drainage on the Rogue River National Forest in Oregon were killed by this insect, marking the southern-most occurrence of the balsam woolly in Oregon.

The most extensive losses in Pacific silver fir stands occurred on the Gifford Pinchot National Forest in Washington and the Siuslaw National Forest in Oregon (table 4).

The damage trend in Pacific silver fir stands is variable, increasing in Washington and decreasing slightly in Oregon. In both states, the damage in subalpine fir stands will probably decrease because of the cool wet weather that occurred when the balsam woolly aphid emerged this spring.

Direct control of this insect is impractical. Importation and colonization of foreign predators is continuing.

Table 3.--Trend of balsam woolly aphid infestations in Oregon and Washington, 1959-62

(In acres)

Year of detection	Area of epidemic infestations: Oregon	Washington	Regional total
1959	50,880	108,480	159,360
1960	66,440	760	67,200
1961	78,080	2,320	80,400
1962	51,800	4,710	56,510

Table 4.--Extent of balsam woolly aphid infestations in Oregon and Washington in 1962, by administrative area and intensity of infestation

Administrative area 1/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	All Intensities
	Number	Acres			
Oregon:					
Willamette N.F.	76	26,680	6,480	760	33,920
Mt. Hood N.F.	13	5,840	0	0	5,840
Umpqua N.F.	8	3,960	320	0	4,280
Deschutes N.F.	7	4,000	0	0	4,000
Siuslaw N.F.	1	2,080	1,380	0	3,460
Winema N.F.	1	300	0	0	300
Oregon areas	106	42,860	8,180	760	51,800
Washington:					
Gifford Pinchot N.F.	16	1,990	600	0	2,590
S.W. Washington (W.S.D.N.R.)	2	1,760	0	0	1,760
Yakima I. R.	2	360	0	0	360
Washington areas	20	4,110	600	0	4,710
All areas	126	46,970	8,780	760	56,510

1/ N.F., National Forest; I.R., Indian Reservation; W.S.D.N.R., Washington State Department of Natural Resources

PINE NEEDLE SCALE
Phenacaspis pinifoliae (Fitch)

This insect caused considerable damage and some tree mortality in ponderosa pine stands near The Dalles and in the lower Hood River Valley, Oregon. Subepidemic damage was common on a variety of pines at other locations. Chronic infestations in the Wenatchee Valley, Washington subsided in 1962. Outbreaks of this insect have been attributed to reduction of predators and parasites caused by spray drift from nearby orchards; however, this has not been proven. This insect and the damage it caused under forest conditions are not sufficiently important to warrant control in 1963.

BARK BEETLES

MOUNTAIN PINE BEETLE
Dendroctonus monticolae Hopk.

The total infested acreage in western white pine, lodgepole pine, and young ponderosa pine stands decreased slightly but losses remained very high (table 5).

The majority of the losses in western white pine stands occurred on the Gifford Pinchot National Forest and Olympic National Park in Washington, and on the Mt. Hood and Willamette National Forests in Oregon (table 6). Aggressive sanitation and salvage logging operations are in progress in heavily infested areas on the Mt. Hood National Forest and similar operations will be started on the Gifford Pinchot and Snoqualmie National Forests in 1963 as market conditions permit.

The majority of lodgepole pine mortality occurred on the Winema, Fremont, and Deschutes National Forests in Oregon and on the Colville National Forest in Washington (table 7).

Attacks in stagnated pole-size ponderosa pine stands decreased in Oregon and remained static in Washington (table 8). The most extensive losses occurred on the Fremont and Rogue River National Forests in Oregon and on the Yakima Indian Reservation in Washington.

The trend of damage is upward in western white pine and lodgepole pine stands in Washington and downward in Oregon. In stagnated ponderosa pine stands, the trend is strongly downward in Oregon and static in Washington.

Control of this beetle in western pine stands is impractical because of the prevalence of blister rust. About all that can be done is to log the infested trees and green, intermingled white pines. Thinning in stagnated ponderosa pine stands should improve tree vigor and reduce further beetle-caused losses. Maintenance control operations are planned against this beetle in lodgepole pine stands in Crater Lake National Park in 1963.

Table 5.--Trend of mountain pine beetle infestations in Oregon and Washington, by host species, 1959-62[1/]
(In acres)

Year of detection	Area of epidemic infestations							Regional total, All species
	Oregon				Washington			
	W	L	P	S	W	L	P	
1959	60,000	34,160	4,240	0	153,340	7,600	6,080	265,420
1960	31,040	40,080	14,520	480	209,400	6,440	4,740	306,700
1961	114,380	77,680	16,640	0	291,760	1,520	1,200	503,180
1962	73,720	65,200	3,820	160	349,770	3,050	1,345	497,065

1/ Host species are: W, western white pine; L, lodgepole pine; P, Ponderosa pine; S, sugar pine.

Table 6.--Extent of mountain pine beetle infestations in western white pine in Oregon and Washington in 1962, by administrative area and intensity of infestation

Administrative area 1/	Infestations centers	Intensity of infestation: Light	Moderate	Heavy	Very Heavy	All Intensities
	Number	Acres				
Oregon:						
Mt. Hood N.F.	109	12,940	10,680	7,900	1,720	33,240
Willamette N.F.	92	14,080	9,680	7,720	1,080	32,560
Umpqua N.F.	21	6,680	600	480	0	7,760
Warm Springs I.R.	2	160	0	0	0	160
Oregon areas	224	33,860	20,960	16,100	2,800	73,720
Washington:						
Gifford Pinchot N.F.	93	67,930	52,300	17,000	3,140	140,370
Olympic N.P.	39	19,480	49,920	15,840	1,760	87,000
Wenatchee N.F.	99	19,520	10,000	4,960	0	34,480
Snoqualmie N.F.	98	24,415	7,320	320	0	32,055
Mt. Baker N.F.	40	8,060	8,840	4,240	4,400	25,540
Olympic N.F.	14	6,200	1,280	8,800	2,720	19,000
Mt. Rainier N.P.	25	2,695	2,960	1,320	280	7,255
Quinault I.R.	3	2,560	0	0	0	2,560
Kaniksu N.F.	5	940	0	0	0	940
Yakima I. R.	2	320	0	0	0	320
Okanogan N.F.	1	250	0	0	0	250
Washington areas	419	152,370	132,620	52,480	12,300	349,770
Regional total	643	186,230	153,580	68,580	15,100	423,490

1/ N.F., National Forest; I.R., Indian Reservation; N.P., National Park.

Table 7.--Extent of mountain pine beetle infestations in lodgepole pine in Oregon and Washington in 1962, by administrative area and intensity of infestation

Administrative area 1/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very Heavy	All Intensities
	Number	Acres				
Oregon:						
Winema N.F.	41	12,450	4,760	2,700	480	20,390
Fremont N.F.	27	2,080	4,200	8,400	3,440	18,120
Deschutes N.F.	19	7,050	6,360	3,360	960	17,730
Crater Lake N.P.	4	4,920	520	0	0	5,440
Malheur N.F.	19	0	700	745	5	1,450
Wallowa-Whitman N.F.	31	315	335	505	5	1,160
Rogue River N.F.	1	0	640	0	0	640
Umpqua N.F.	1	0	200	0	0	200
Umatilla N.F.	3	10	50	0	0	60
Ochoco N.F.	1	0	0	10	0	10
Oregon areas	147	26,825	17,765	15,720	4,890	65,200
Washington:						
Colville N.F.	2	480	0	0	1,240	1,720
Wenatchee N.F.	2	800	0	0	0	800
Okanogan N.F.	5	310	80	0	0	390
Colville I.R.	2	40	80	0	0	120
Umatilla N.F.	1	0	0	10	0	10
Kaniksu N.F.	1	10	0	0	0	10
Washington areas	13	1,640	160	10	1,240	3,050
Regional total	160	28,465	17,925	15,730	6,130	68,250

1/ N.F., National Forest; N.P., National Park; I.R., Indian Reservation.

Table 8.--Extent of mountain pine beetle infestations in ponderosa pine in Oregon and Washington in 1962, by administrative area and intensity of infestation

Administrative area 1/	Infestation centers	Intensity of infestation				All Intensities
		Light	Moderate	Heavy	Very Heavy	
	Number	Acres				
Oregon:						
Fremont N.F.	5	0	880	120	380	1,380
Rogue River N.F.	5	720	480	0	0	1,200
Wallowa-Whitman N.F.	7	0	645	265	0	910
Malheur N.F.	2	0	160	120	0	280
Umatilla N.F.	1	0	50	0	0	50
Oregon areas	20	720	2,215	505	380	3,820
Washington:						
Yakima I.R.	2	880	0	80	0	960
Umatilla N.F.	3	25	160	0	0	185
Colville N.F.	9	160	0	0	0	160
Glenwood District (W.S.D.N.R.)	1	40	0	0	0	40
Washington areas	15	1,105	160	80	0	1,345
All areas	35	1,825	2,375	585	380	5,165

1/ N.F., National Forest; I.R., Indian Reservation; W.S.D.N.R., Washington State Department of Natural Resources

WESTERN PINE BEETLE
Dendroctonus brevicomis Lec.

Losses of mature ponderosa pine caused by this insect increased considerably in east side Oregon forests and decreased on Washington forests (table 9). In Oregon the largest and most severe outbreaks occurred in the Ochoco, Fremont, Malheur, and Deschutes National Forests (table 10). The majority of losses in Washington were centered on the Yakima Indian Reservation and Gifford Pinchot National Forest.

The trend of damage is strongly upward in eastern Oregon forests. During 1961 and 1962, about 25,600,000 board feet of mature ponderosa pine was killed by the western pine beetle on parts of the Fremont National Forest alone. In this area the infestation trend varies from 2:1 to 6:1.[5/] Infestations in eastern Washington forests are decreasing. Heavy blowdown left in the wake of the October 12, 1962 storm will further complicate the problems, especially in areas where beetle populations are already high. In these areas the western pine beetle will attack the down timber in the spring of 1963, breed and produce new adults that will emerge about mid-August 1963. Salvage of the windthrown timber before mid-August 1963 is essential to prevent continued high level losses by the western pine beetle.

Sanitation-salvage logging is recommended in all stands and particularly in those having a high percentage of high-risk elements.

Table 9.--Trend of western pine beetle infestations in Oregon and Washington, 1959-62

(In acres)

Year of detection	Area of epidemic infestations		Regional Total
	Oregon	Washington	
1959	106,000	188,300	294,300
1960	142,520	18,300	160,820
1961	180,040	12,760	192,800
1962	392,385	6,380	398,765

5/ Dolph, R. E. and J. F. Wear, A survey of western pine beetle damage on the Fremont National Forest using color photographs. U.S. Forest Service, 8 pp., April 1963. (Processed).

Table 10.--Extent of western pine beetle infestations in Oregon and Washington in 1962, by administrative area and intensity of infestation

Administrative area 1/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very Heavy	All Intensities
	Number	Acres				
Oregon:						
Ochoco N.F.	51	73,400	41,410	4,200		119,010
Fremont N.F.	91	60,790	17,740	12,040	8,440	99,010
Malheur N.F.	121	55,880	15,565	220	0	71,665
Deschutes N.F.	43	26,240	4,120	20	0	30,380
Warm Springs I.R.	11	17,160	2,080	0	0	19,240
Umatilla N.F.	56	14,445	4,330	0	0	18,775
Winema N.F.	45	13,520	840	0	0	14,360
Rogue River N.F.	23	10,800	3,520	0	0	14,320
Mt. Hood N.F.	8	2,440	200	0	0	2,640
Wallowa-Whitman N.F.	12	980	265	0	0	1,245
Siskiyou N.F.	3	800	160	0	0	960
Crater Lake N.P.	0	620	0	0	0	620
Umpqua N. F.	1	160	0	0	0	160
Oregon areas	465	277,235	90,230	16,480	8,440	392,385
Washington:						
Yakima I.R.	3	2,680	0	0	0	2,680
Gifford Pinchot N.F.	1	1,720	0	0	0	1,720
Colville I.R.	2	940	0	0	0	940
N.E. Washington (W.S.D.N.R.)	1	360	0	0	0	360
Okanogan N.F.	3	340	0	0	0	340
Glenwood District (W.S.D.N.R.)	1	200	0	0	0	200
Snoqualmie N.F.	1	30	0	0	0	30
Umatilla N.F.	2	110	0	0	0	110
Washington areas	14	6,380	0	0	0	6,380
Regional total	479	283,615	90,230	16,480	8,440	398,765

1/ N.F., National Forest; I.R., Indian Reservation; N.P., National Park; W.S.D.N.R., Washington State Department of Natural Resources.

DOUGLAS-FIR BEETLE
Dendroctonus pseudotsugae Hopk.

Epidemic outbreaks of the Douglas-fir beetle in both States declined significantly in 1962, but substantial timber losses occurred (table 11). The largest remaining infestations in Washington were on the Okanogan and Colville National Forests and the Colville Indian Reservation. Lighter damage also was recorded on other Washington forests. In Oregon, epidemic outbreaks continued on the Wallowa-Whitman and Umatilla National Forests (table 12).

The trend of Douglas-fir beetle outbreaks is downward in Washington and western Oregon and upward in eastern Oregon. The blowdown resulting from the October 12, 1962 and subsequent storms may cause a beetle buildup that could cause severe tree mortality in 1964.

Salvage of currently infested trees before the beetles fly in 1963 is desirable to save timber values and control beetle populations. In addition, windthrown timber should be salvaged promptly to minimize possible beetle losses in 1964. For the maximum benefit, this type of material should be removed from the woods by mid-April 1964.

Table 11.--Trend of Douglas-fir beetle infestations in Oregon and Washington, 1959-62

(In acres)

Year of detection	Area of epidemic infestations: Oregon	Washington	Regional total
1959	292,520	32,320	324,840
1960	114,160	104,440	218,600
1961	70,120	99,140	169,260
1962	26,540	55,990	82,530

Table 12.--Extent of Douglas-fir beetle infestations in Oregon and Washington in 1962, by administrative area and intensity of infestation

Administrative area 1/	Infestation centers	Intensity of infestation			All Intensities
		Light	Moderate	Heavy	
	Number	Acres			
Oregon:					
Wallowa-Whitman N.F.	67	5,215	5,940	1,340	12,495
Umatilla N.F.	36	4,765	630	240	5,635
Rogue River N.F.	8	2,760	280	0	3,040
Siuslaw N.F.	8	1,560	0	0	1,560
Siskiyou N.F.	5	680	420	60	1,160
Umpqua N.F.	9	740	0	0	740
Ochoco N.F.	3	640	10	0	650
Mt. Hood N.F.	4	600	0	0	600
Malheur N.F.	2	400	120	0	520
Umatilla I.R.	1	0	80	0	80
Warm Springs I.R.	1	60	0	0	60
Oregon areas	144	17,420	7,480	1,640	26,540
Washington:					
Okanogan N.F.	135	20,970	3,090	0	24,060
Colville N.F.	30	11,865	3,040	0	14,905
Colville I. R.	18	5,490	0	2,160	7,650
Wenatchee N.F.	21	4,040	40	0	4,080
Gifford Pinchot N.F.	12	2,550	0	0	2,550
Snoqualmie N.F.	10	1,720	80	0	1,800
Umatilla N.F.	8	160	150	15	325
S.W. Washington (W.S.D.N.R.)	3	320	0	0	320
Kaniksu N.F.	2	220	0	0	220
N.E. Washington (W.S.D.N.R.)	1	80	0	0	80
Washington areas	240	47,415	6,400	2,175	55,990
Regional total	384	64,835	13,880	3,815	82,530

1/ N.F., National Forest; I.R., Indian Reservation; W.S.D.N.R,, Washington State Department of Natural Resources.

FIR ENGRAVER
Scolytus ventralis Lec.

The acreage of true fir stands infested by this beetle doubled in 1962 (table 13). The largest increase occurred on the Umatilla, Wallowa-Whitman, and Ochoco National Forests in Oregon. In Washington, the largest and most severe areas of damage were on the Snoqualmie, Umatilla, and Gifford Pinchot National Forests (table 14). Much of the tree mortality occurred in low value, overmature and decadent stands; however, considerable damage also was recorded in thrifty young stands. In these young stands, Christmas tree values were wiped out in several areas. Control of the fir engraver is impractical in this region since broods frequently develop and emerge without killing the tree. Spotting such infestations is extremely difficult. Outbreaks are generally associated with drought periods and generally subside rapidly when moisture conditions return to normal.

Table 13.--Trend of fir engraver infestations in Oregon and Washington, 1959-62

(In acres)

Year of detection	Area of epidemic infestations: Oregon	Washington	Regional total
1959	15,520	18,640	34,160
1960	27,240	14,680	41,920
1961	43,720	17,800	61,520
1962	105,450	22,820	128,270

Table 14.--Extent of fir engraver infestations in Oregon and Washington in 1962, by administrative area and intensity of infestation

Administrative area 1/	Infestation centers	Intensity of infestation				All Intensities
		Light	Moderate	Heavy	Very Heavy	
	Number	Acres				
Oregon:						
Umatilla N.F.	91	22,090	12,245	7,440	0	41,775
Fremont N.F.	40	3,160	7,360	7,480	740	18,740
Wallowa-Whitman N.F.	65	6,410	4,915	560	0	11,885
Ochoco N.F.	25	4,510	6,800	10	0	11,320
Rogue River N.F.	20	7,240	2,880	720	0	10,840
Malheur N.F.	26	1,375	1,070	755	0	3,200
Winema N.F.	3	0	200	2,920	0	3,120
Willamette N.F.	3	360	640	0	0	1,000
Deschutes N.F.	4	300	0	650	0	950
Mt. Hood N.F.	7	480	440	0	0	920
Umpqua N.F.	4	560	0	200	0	760
Umatilla I.R.	4	460	240	0	0	700
Warm Springs I.R.	2	0	160	0	0	160
Crater Lake N.P.	1	80	0	0	0	80
Oregon areas	295	47,025	36,950	20,735	740	105,450
Washington:						
Snoqualmie N.F.	1	5,480	0	0	0	5,480
Umatilla N.F.	20	1,110	2,860	20	0	3,990
Gifford Pinchot N.F.	1	3,400	0	0	0	3,400
Colville N.F.	8	2,955	0	0	0	2,955
Kaniksu N.F.	4	2,800	0	C	0	2,800
Mt. Baker N.F.	3	900	640	0	0	1,540
Okanogan N.F.	12	1,175	0	0	0	1,175
Wenatchee N.F.	5	680	0	0	0	680
Yakima I.R.	1	400	0	0	0	400
N.E. Washington (W.S.D.N.R.)	2	280	0	0	0	280
Glenwood District (W.S.D.N.R.)	1	120	0	0	0	120
Washington areas	58	19,300	3,500	0		22,820
Regional total	353	66,325	40,450	20,755	740	128,270

1/ N.F., National Forest; I.R., Indian Reservation; N.P., National Park, W.S.D.N.R., Washington State Department of Natural Resources.

OREGON PINE IPS
Ips oregonis (Eichh.)

Regionwide infestations of Oregon pine ips in ponderosa pine sapling stands doubled (table 15). Again this year most of the mortality occurred in young stands growing on the timber margins where growing conditions are severe. The most severe and extensive outbreaks in Oregon occurred on the Dooley Mountain-Huckleberry Mountain ridge on the Wallowa-Whitman National Forest. Less extensive damage occurred on the Malheur National Forest near Calamity Butte, Blue Mountain, Hot Springs and in the East Fork Beech Creek drainage (table 16).

Proper timing and handling of logging and thinning slash will minimize the possibility of a severe outbreak developing. In some areas direct control measures may be necessary to prevent extensive losses.

Table 15.--Trend of Oregon pine ips infestations in Oregon and Washington, 1959-62

(In acres)

Year of detection	Area of epidemic infestations		
	Oregon	Washington	Regional total
1959	37,440	25,800	63,240
1960	38,160	3,360	41,520
1961	15,880	7,560	23,440
1962	43,610	1,970	45,580

Table 16.--Extent of Oregon pine ips infestations in Oregon and Washington in 1962, by administrative area and intensity of infestation

Administrative area 1/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very Heavy	All Intensities
	Number	Acres				
Oregon:						
Wallowa-Whitman N.F.	128	3,110	4,190	8,510	1,150	16,960
Malheur N.F.	109	3,050	4,350	5,020	1,160	13,580
Umatilla N.F.	30	615	1,035	1,485	0	3,135
Ochoco N.F.	10	10	2,240	840	0	3,090
Rogue River N.F.	13	1,440	640	160	0	2,240
Siskiyou N.F.	8	1,800	400	0	0	2,200
Fremont N.F.	4	60	1,680	0	0	1,740
Winema N.F.	3	240	80	40	0	360
Mt. Hood N.F.	3	0	0	200	0	200
Umatilla I.R.	3	0	105	0	0	105
Oregon areas	311	10,325	14,720	16,255	2,310	43,610
Washington:						
Umatilla N.F.	18	160	530	395	70	1,155
N.E. Washington (W.S.D.N.R.)	16	215	85	100	0	400
Kaniksu N.F.	4	135	5	0	0	140
Colville I.R.	4	110	0	0	0	110
Colville N.F.	7	90	10	0	0	100
Okanogan N.F.	2	35	0	0	0	35
Glenwood District (W.S.D.N.R.)	2	20	0	0	0	20
Spokane I.R.	2	10	0	0	0	10
Washington areas	55	775	630	495	70	1,970
Regional total	366	11,100	15,350	16,750	2,380	45,580

1/ N.F., National Forest; I.R., Indian Reservation; W.S.D.N.R., Washington State Department of Natural Resources

ENGELMANN SPRUCE BEETLE
Dendroctonus engelmanni Hopk.

Epidemic outbreaks of this beetle in Oregon and Washington remained well below the critical level (table 17). Losses in Oregon were centered on the Wallowa-Whitman, Umatilla, and Willamette National Forests. The majority of the damage in Washington occurred on the Pomeroy District of the Umatilla National Forest. The trend of damage appears to be slightly upward, but varies with locality.

Most infestations are located in inaccessible areas. Where infestations are relatively accessible, infested trees should be logged to reduce beetle populations and save timber values. No control is planned for 1963. However, if the apparent increase continues, control through use of trap trees will be considered.

Table 17.--Trend of Engelmann spruce beetle infestations in Oregon and Washington, 1959-62

(In acres)

Year of detection	Area of epidemic infestation: Oregon	Washington	Regional Total
1959	4,800	3,520	8,320
1960	1,840	3,120	4,960
1961	2,560	5,000	7,560
1962	1,230	6,280	7,510

SILVER FIR BEETLES
Pseudohylesinus spp.

Epidemic outbreaks were very low this year (table 18). One small infestation of light to moderate intensity occurred in Pacific silver fir stands in the Slickrock Creek drainage on the Siuslaw National Forest. Much of the infested timber and intermingled green trees were blown down during the October 12, 1962 storm. No control other than logging infested trees is needed in 1963.

Table 18.--Trend of silver fir beetle infestations in western Oregon and western Washington, 1959-62

(In acres)

Year of detection	Area of epidemic infestation: Oregon	Washington	Regional total
1959	320	32,800	33,120
1960	0	3,120	3,120
1961	480	3,040	3,520
1962	480	0	480

OTHER FOREST PROBLEMS

Windthrown Timber

An estimated 11.19 billion board feet of timber in Oregon and Washington fell during the October 12, 1962 windstorm.[6/] This vast quantity of down material may provide an excellent breeding place for bark beetles. It may be attacked during 1963 and produce broods of beetles that would normally emerge late in 1963 or in 1964 to attack surrounding green trees, thus adding significantly to the already heavy timber losses.

The insect potential in windthrown timber varies by species. In the past, Douglas-fir beetle epidemics have followed severe windthrow in Oregon and Washington. Western pine beetle populations usually cause more tree mortality for a year or two following extensive windfall. Increased losses following these earlier storms were favored because beetle populations were already high and the timber blown down was much fresher. There is some basis for mild optimism this year. The timber has dried out slightly and may be less attractive to the relatively low beetle populations. However, it is best to assume that an outbreak will develop and formulate logging and salvage plans accordingly.

Windthrow in other tree species in this region does not create a significant bark beetle threat.

Dying Hemlock

The acreage of mature western hemlock dying from unknown causes increased in Oregon and decreased in Washington (table 19). Again this

6/ Orr, P.W., Windthrown timber survey in the Pacific Northwest during 1962. U.S. Forest Service, 22 pp., illus. (Processed). March 1963

year, the most extensive and severe losses occurred in Washington on the Mt. Baker and Olympic National Forests and Olympic National Park (table 20). The only damage detected in Oregon occurred on the Siuslaw National Forest. No control measures, save salvage logging, have been developed to control this problem.

Table 19.--Trend of dying western hemlock in western Oregon and western Washington, 1959-62

(In acres)

Year of detection	Area of epidemic infestation		Regional Total
	Oregon	Washington	
1959	6,240	138,880	145,120
1960	2,000	33,120	35,120
1961	480	353,040	353,520
1962	1,280	223,680	224,960

Table 20.--Extent of dying hemlock in Oregon and Washington in 1962, by administrative area and intensity of infestation

Administrative area 1/	Infestation centers	Intensity of infestation				All Intensities
		Light	Moderate	Heavy	Very Heavy	
	Number	Acres				
Oregon:						
Siuslaw N.F.	3	1,280	0	0	0	1,280
Washington:						
Mt. Baker N.F.	71	24,280	29,920	19,580	5,560	79,340
Olympic N.P.	17	43,520	26,080	0	0	69,600
Olympic N.F.	20	45,440	15,360	0	0	60,800
Snoqualmie N.F.	23	4,860	4,840	400	0	10,100
S.W. Washington (W.S.D.N.R.)	10	3,840	0	0	0	3,840
Washington areas	141	121,940	76,200	19,980	5,560	223,680
Regional total	144	123,220	76,200	19,980	5,560	224,960

1/ N.F., National Forest; I.R., Indian Reservation; N.P., National Park; W.S.D.N.R., Washington State Department of Natural Resources.

Bear Damage

Regionwide, bear damage in young Douglas-fir and western hemlock stands decreased significantly in 1962 (table 21). Young, already understocked stands, in Northwest Oregon and on the Siuslaw National Forest suffered light to moderate damage. In Washington, the majority of the damage was centered on the Olympic National Forest (table 22).

Table 21.--Trend of bear damage in western Oregon and western Washington, 1959-62

(In acres)

Year of detection	Area of epidemic infestation		Regional Total
	Oregon	Washington	
1959	102,160	17,920	120,080
1960	33,720	18,980	52,700
1961	129,920	113,400	243,320
1962	109,700	27,405	137,105

Table 22.--Extent of bear damage in Oregon and Washington in 1962, by administrative area and intensity of infestation

Administrative area 1/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	All Intensities
	Number	Acres			
Oregon:					
N.W. Oregon (O.S.D.F.)	30	30,440	12,480	0	42,920
Siuslaw N.F.	29	20,780	7,040	480	28,300
Willamette N.F.	29	19,600	5,160	1,440	26,200
Mt. Hood N.F.	20	8,240	4,040	0	12,280
Oregon areas	108	79,060	28,720	1,920	109,700
Washington:					
Olympic N.F.	14	16,520	5,240	0	21,760
Quinault I.R.	1	2,560	800	0	3,360
Gifford Pinchot N.F.	3	960	0	0	960
S.W. Washington (W.S.D.N.R.)	1	800	0	0	800
Snoqualmie N.F.	2	525	0	0	525
Washington areas	21	21,365	6,040	0	27,405
Regional total	129	100,425	34,760	1,920	137,105

1/ O.S.D.F., Oregon State Department of Forestry; N.F., National Forest; I.R., Indian Reservation; W.S.D.N.R., Washington State Department of Natural Resources.

APPENDIX

Organization and Conduct of the Aerial Survey

The aerial survey of the 52 million acres of timberlands in Oregon and Washington was a cooperative undertaking by the Oregon State Department of Forestry, Washington Department of Natural Resources, and the U. S. Forest Service. The survey was made between July 16 and August 17. Several later flights were made in the fall to detect western hemlock looper defoliation in western Oregon and Washington. A total of 241.4 hours of flying time were required to complete the survey (table 23).

Table 23.--Summary of cooperative aerial survey activities in 1962

Area covered	Timbered area surveyed	Survey flight time		
		Mapping	Ferrying	Total
	M Acres	----- Hours ----		
Western Oregon	14,815	58.8	2.7	61.5
Eastern Oregon	12,492	53.0	6.0	59.0
Western Washington	13,069	60.8	7.6	68.4
Eastern Washington	11,660	47.5	5.0	52.5
All areas	52,036	220.1	21.3	241.4

Table 24.--Extent of epidemic infestations in Oregon in 1962, by forest area, insect species, and intensity of infestation

Administrative area and insects involved 1/2/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very Heavy	All Intensities
	Number	Acres				
Crater Lake N.P.:						
Mountain pine beetle (L)	5	4,920	520	0	0	5,440
Western pine beetle	2	620	0	0	0	620
Fir engraver	1	80	0	0	0	80
All insects	8	5,620	520	0	0	6,140
Blowdown	1	0	0	0	80	80
All damage	9	5,620	520	0	80	6,220
Deschutes N.F. and adjacent forest lands:						
Balsam woolly aphid	7	4,000	0	0	0	4,000
Western pine beetle	43	26,240	4,120	20	0	30,380
Mountain pine beetle (L)	19	7,050	6,360	3,360	960	17,730
Fir engraver	4	300	0	650	0	950
All insects	73	37,590	10,480	4,030	960	53,060

See footnote at end of table.

Table 24.--Extent of epidemic infestations in Oregon in 1962, by forest area, insect species, and intensity of infestation (Cont.)

Administrative area and insects involved 1/ 2/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very Heavy	All Intensities
	Number	Acres				
Fremont N.F. and adjacent forest lands:						
Spruce budworm	11	38,860	3,200	0	0	42,060
Western pine beetle	91	60,790	17,740	12,040	8,440	99,010
Fir engraver	40	3,160	7,360	7,480	740	18,740
Mountain pine beetle (L)	27	2,080	4,200	8,400	3,440	18,120
Mountain pine beetle (P)	5	0	880	120	380	1,380
Oregon pine ips	4	60	1,680	0	0	1,740
All insects	178	104,950	35,060	28,040	13,000	181,050
Malheur N.F. and adjacent forest lands:						
Contarinia	1	0	0	200	0	200
Western pine beetle	121	55,880	15,565	220	0	71,665
Oregon pine ips	109	3,050	4,350	5,020	1,160	13,580
Fir engraver	26	1,375	1,070	755	0	3,200
Mountain pine beetle (L)	19	0	700	745	5	1,450
Mountain pine beetle (P)	2	0	160	120	0	280
Douglas-fir beetle	2	400	120	0	0	520
All insects	280	60,705	21,965	7,060	1,165	90,895

See footnote at end of table.

Table 24.--Extent of epidemic infestations in Oregon in 1962, by forest area, insect species, and intensity of infestation (Cont.)

Administrative area and insects involved 1/2/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very Heavy	All Intensities
	Number	Acres				
Mt. Hood N.F. and adjacent forest lands:						
Balsam woolly aphid	13	5,840	0	0	0	5,840
Pine scale	6	0	920	360	640	1,920
Mountain pine beetle (W)	109	12,940	10,680	7,900	1,720	33,240
Western pine beetle	8	2,440	200	0	0	2,640
Fir engraver	7	480	440	0	0	920
Douglas-fir beetle	4	600	0	0	0	600
Oregon pine ips	3	0	0	200	0	200
Douglas-fir engraver	1	0	0	160	0	160
All insects	151	22,300	12,240	8,620	2,360	45,520
Bear damage	20	8,240	4,040	0	0	12,280
All damage	171	30,540	16,280	8,620	2,360	57,800
Northwest Oregon (O.S.D.F.)						
Western hemlock looper	14	110	340	610	0	1,060
Bear damage	30	30,440	12,480	0	0	42,920
All damage	44	30,550	12,820	610	0	43,980

See footnote at end of table.

Table 24.--Extent of epidemic infestations in Oregon in 1962, by forest area, insect species, and intensity of infestation (Cont.)

Administrative area and insects involved 1/2/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very Heavy	All Intensities
	Number			Acres		
Ochoco N.F. and adjacent forest lands:						
Western pine beetle	51	73,400	41,410	4,200	0	119,010
Fir engraver	25	4,510	6,800	10	0	11,320
Oregon pine ips	10	10	2,240	840	0	3,090
Douglas-fir beetle	3	640	10	0	0	650
Mountain pine beetle (L)	1	0	0	10	0	10
All insects	90	78,560	50,460	5,060	0	134,080
Rogue River N.F. and adjacent forest lands:						
Needle sheath miner (P)	3	2,080	1,920	0	0	4,000
Western pine beetle	23	10,800	3,520	0	0	14,320
Fir engraver	20	7,240	2,880	720	0	10,840
Douglas-fir beetle	8	2,760	280	0	0	3,040
Oregon pine ips	13	1,440	640	160	0	2,240
Mountain pine beetle (P)	5	720	480	0	0	1,200
Mountain pine beetle (L)	1	0	640	0	0	640
Mountain pine beetle (S)	1	160	0	0	0	160
All insects	74	25,200	10,360	880	0	36,440
Blowdown	1	0	0	0	120	120
All damage	75	25,200	10,360	880	120	36,560

See footnote at end of table.

Table 24.--Extent of epidemic infestations in Oregon in 1962, by forest area, insect species, and intensity of infestation (Cont.)

Administrative area and insects involved 1/2/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very Heavy	All Intensities
	Number	Acres				
Siskiyou N.F. and adjacent forest lands:						
Oregon pine ips	8	1,800	400	0	0	2,200
Douglas-fir beetle	5	680	420	60	0	1,160
Western pine beetle	3	800	160	0	0	960
All insects	16	3,280	980	60	0	4,320
Siuslaw N.F. and adjacent forest lands:						
Western oak looper	5	1,240	0	0	0	1,240
Balsam woolly aphid	1	2,080	1,380	0	0	3,460
Douglas-fir beetle	8	1,560	0	0	0	1,560
Silver fir beetle	1	0	480	0	0	480
All insects	15	4,880	1,860	0	0	6,740
Bear damage	29	20,780	7,040	480	0	28,300
Dying hemlock	3	1,280	0	0	0	1,280
All damage	47	26,940	8,900	480	0	36,320
Umatilla I.R.:						
Unknown sawfly (P)	4	400	680	0	0	1,080
Fir engraver	4	460	240	0	0	700
Oregon pine ips	3	0	105	0	0	105
Douglas-fir beetle	1	0	80	0	0	80
All insects	12	860	1,105	0	0	1,965

See footnote at end of table.

Table 24.--Extent of epidemic infestations in Oregon in 1962, by forest area, insect species, and intensity of infestation (Cont.)

Administrative area and insects involved 1/2/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very Heavy	All Intensities
	Number	Acres				
Umatilla N.F. and adjacent forest lands:						
Fir engraver	91	22,090	12,245	7,440	0	41,775
Western pine beetle	56	14,445	4,330	0	0	18,775
Douglas-fir beetle	36	4,765	630	240	0	5,635
Oregon pine ips	30	615	1,035	1,485	0	3,135
Engelmann spruce beetle	6	310	550	0	0	860
Mountain pine beetle (L)	3	10	50	0	0	60
Mountain pine beetle (P)	1	0	50	0	0	50
All insects	223	42,235	18,890	9,165	0	70,290
Umpqua N.F. and adjacent forest lands:						
Unknown sawfly (L)	2	640	800	2,880	480	4,800
Balsam woolly aphid	8	3,960	320	0	0	4,280
Mountain pine beetle (W)	21	6,680	600	480	0	7,760
Mountain pine beetle (L)	1	0	200	0	0	200
Fir engraver	4	560	0	200	0	760
Douglas-fir beetle	9	740	0	0	0	740
Western pine beetle	1	160	0	0	0	160
All insects	46	12,740	1,920	3,560	480	18,700

See footnote at end of table.

Table 24.--Extent of epidemic infestations in Oregon in 1962, by forest area, insect species, and intensity of infestation (Cont.)

Administrative area and insects involved 1/2/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very Heavy	All Intensities
	Number	Acres				
Wallowa-Whitman N.F. and adjacent forest lands:						
Contarinia	7	14,080	120	170	0	14,370
Spruce budworm	3	4,670	1,640	0	0	6,310
Unknown sawfly (WL)	3	0	0	170	0	170
Oregon pine ips	128	3,110	4,190	8,510	1,150	16,960
Douglas-fir beetle	67	5,215	5,940	1,340	0	12,495
Fir engraver	65	6,410	4,915	560	0	11,885
Mountain pine beetle (L)	31	315	335	505	5	1,160
Mountain pine beetle (P)	7	0	645	265	0	910
Western pine beetle	12	980	265	0	0	1,245
Engelmann spruce beetle	2	130	0	0	0	130
All insects	325	34,910	18,050	11,520	1,155	65,635
Warm Springs I.R.:						
Western pine beetle	11	17,160	2,080	0	0	19,240
Mountain pine beetle (W)	2	160	0	0	0	160
Fir engraver	2	0	160	0	0	160
Douglas-fir beetle	1	60	0	0	0	60
All insects	16	17,380	2,240	0	0	19,620

See footnote at end of table.

Table 24.--Extent of epidemic infestations in Oregon in 1962, by forest area, insect species, and intensity of infestation (Cont.)

Administrative area and insects involved 1/2/	Infestation centers	Intensity of infestation: Light	Moderate	Heavy	Very Heavy	All Intensities
	Number	Acres				
Willamette N.F. and adjacent forest lands:						
Balsam woolly aphid	76	26,680	6,480	760	0	33,920
Mountain pine beetle (W)	92	14,080	9,680	7,720	1,080	32,560
Fir engraver	3	360	640	0	0	1,000
Engelmann spruce beetle	2	240	0	0	0	240
All insects	173	41,360	16,800	8,480	1,080	67,720
Bear damage	29	19,600	5,160	1,440	0	26,200
Blowdown	1	0	0	0	160	160
All damage	203	60,960	21,960	9,920	1,240	94,080
Winema N.F. and adjacent forest lands:						
Balsam woolly aphid	1	300	0	0	0	300
Mountain pine beetle (L)	41	12,450	4,760	2,700	480	20,390
Western pine beetle	45	13,520	840	0	0	14,360
Fir engraver	3	0	200	2,920	0	3,120
Oregon pine ips	3	240	80	40	0	360
All insects	93	26,510	5,880	5,660	480	38,530

1/ Mountain pine beetle damage has been separated by tree species attached: L, lodgepole pine; P, ponderosa pine; W, western white pine; WL, western larch.

2/ Administrative areas are abbreviated as follows: N.F., National Forest; B.L.M., Bureau of Land Management; N.P., National Park; I.R., Indian Reservation; O.S.D.F., Oregon State Dept. of Forestry.

Table 25.--Extent of epidemic infestations in Washington in 1962, by forest area, insect species and intensity of infestation

Administrative area and insects involved 1/ 2/	Infestation centers	Intensity of infestations: Light	Moderate	Heavy	Very Heavy	All Intensities
	Number	Acres				
Colville I.R.:						
Douglas-fir beetle	18	5,490	0	2,160	0	7,650
Western pine beetle	2	940	0	0	0	940
Mountain pine beetle (L)	2	40	80	0	0	120
Oregon pine ips	4	110	0	0	0	110
Engelmann spruce beetle	1	80	0	0	0	80
All insects	27	6,660	80	2,160	0	8,900
Colville N.F. and adjacent forest lands:						
Douglas-fir beetle	30	11,865	3,040	0	0	14,905
Fir engraver	8	2,955	0	0	0	2,955
Mountain pine beetle (L)	2	480	0	0	1,240	1,720
Mountain pine beetle (P)	9	160	0	0	0	160
Douglas-fir engraver	3	300	0	0	0	300
Oregon pine ips	7	90	10	0	0	100
Engelmann spruce beetle	1	0	80	0	0	80
All insects	60	15,850	3,130	0	1,240	20,220

See footnote at end of table.

Table 25.--Extent of epidemic infestations in Washington in 1962, by forest area, insect species and intensity of infestation (Cont.)

Administrative area and insects involved 1/2/	Infestation centers	Intensity of infestations: Light	Moderate	Heavy	Very Heavy	All Intensities
	Number	Acres				
Gifford Pinchot N.F. and adjacent forest lands:						
Balsam woolly aphid	16	1,990	600	0	0	2,590
Mountain pine beetle (W)	93	67,930	52,300	17,000	3,140	140,370
Fir engraver	1	3,400	0	0	0	3,400
Douglas-fir beetle	12	2,550	0	0	0	2,550
Western pine beetle	1	1,720	0	0	0	1,720
All insects	123	77,590	52,900	17,000	3,140	150,630
Bear damage	3	960	0	0	0	960
Blowdown	1	0	0	0	40	40
All damage	127	78,550	52,900	17,000	3,180	151,630
Glenwood District (WSDNR):						
Western pine beetle	1	200	0	0	0	200
Fir engraver	1	120	0	0	0	120
Mountain pine beetle (P)	1	40	0	0	0	40
Oregon pine ips	2	20	0	0	0	20
All insects	5	380	0	0	0	380

See footnotes at end of table.

Table 25.--Extent of epidemic infestations in Washington in 1962, by forest area, insect species and intensity of infestation (Cont.)

Administrative area and insects involved 1/2/	Infestation centers	Intensity of infestations: Light	Moderate	Heavy	Very Heavy	All Intensities
	Number	Acres				
Kaniksu N.F. and adjacent forest lands:						
Fir engraver	4	2,800	0	0	0	2,800
Mountain pine beetle(W)	5	940	0	0	0	940
Mountain pine beetle(L)	1	10	0	0	0	10
Engelmann spruce beetle	3	260	0	0	0	260
Douglas-fir beetle	2	220	0	0	0	220
Oregon pine ips	4	135	5	0	0	140
Douglas-fir engraver	2	110	10	0	0	120
All insects	21	4,475	15	0	0	4,490
Mt. Baker N.F. and adjacent forest lands:						
Mountain pine beetle(W)	40	8,060	8,840	4,240	4,400	25,540
Fir engraver	3	900	640	0	0	1,540
All insects	43	8,960	9,480	4,240	4,400	27,080
Dying hemlock	71	24,280	29,920	19,580	5,560	79,340
All damage	114	33,240	39,400	23,820	9,960	106,420

See footnotes at end of table.

Table 25.--Extent of epidemic infestations in Washington in 1962, by forest area, insect species and intensity of infestation (Cont.)

Administrative area and insects involved 1/2/	Infestation centers	Intensity of infestations: Light	Moderate	Heavy	Very Heavy	All Intensities
	Number			Acres		
Okanogan N.F. and adjacent forest lands:						
Douglas-fir	135	20,970	3,090	0	0	24,060
Fir engraver	12	1,175	0	0	0	1,175
Engelmann spruce beetle	1	0	480	0	0	480
Mountain pine beetle (L)	5	310	80	0	0	390
Western pine beetle	3	340	0	0	0	340
Mountain pine beetle (W)	1	250	0	0	0	250
Oregon pine ips	2	35	0	0	0	35
All insects	159	23,080	3,650	0	0	26,730
Olympic N.F. and adjacent forest lands:						
Mountain pine beetle (W)	14	6,200	1,280	8,800	2,720	19,000
All insects	14	6,200	1,280	8,800	2,720	19,000
Dying hemlock	20	45,440	15,360	0	0	60,800
Bear damage	14	16,520	5,240	0	0	21,760
All damage	48	68,160	21,880	8,800	2,720	101,560

See footnotes at end of table.

Table 25.--Extent of epidemic infestations in Washington in 1962, by forest area, insect species and intensity of infestation (Cont.)

Administrative area and insects involved 1/2/	Infestation centers	Intensity of infestations: Light	Moderate	Heavy	Very Heavy	All Intensities
	Number	Acres				
Mt. Rainier N.P.:						
Mountain pine beetle (W)	25	2,695	2,960	1,320	280	7,255
All insects	25	2,695	2,960	1,320	280	7,255
Northeast Washington (WSDNR):						
Larch casebearer	2	2,720	2,560	0	0	5,280
Tussock moth	2	0	0	80	20	100
Oregon pine ips	16	215	85	100	0	400
Western pine beetle	1	360	0	0	0	360
Fir engraver	2	280	0	0	0	280
Douglas-fir engraver	1	120	0	0	0	120
Douglas-fir beetle	1	80	0	0	0	80
All insects	25	3,775	2,645	180	20	6,620

See footnotes at end of table.

Table 25.--Extent of epidemic infestations in Washington in 1962, by forest area, insect species and intensity of infestation (Cont.)

Administrative area and insects involved 1/2/	Infestation centers	Intensity of infestations: Light	Moderate	Heavy	Very Heavy	All Intensities
	Number			Acres		
Olympic N.P.:						
Mountain pine beetle (W)	39	19,480	49,920	15,840	1,760	87,000
All insects	39	19,480	49,920	15,840	1,760	87,000
Dying hemlock	17	43,520	26,080	0	0	69,600
All damage	56	63,000	76,000	15,840	1,760	156,600
Quinault I.R.						
Mountain pine beetle (W)	3	2,560	0	0	0	2,560
All insects	3	2,560	0	0	0	2,560
Bear damage	1	2,560	800	0	0	3,360
All damage	4	5,120	800	0	0	5,920

See footnotes at end of table.

Table 25.--Extent of epidemic infestations in Washington in 1962, by forest area, insect species and intensity of infestation (Cont.)

Administrative area and insects involved 1/2/	Infestation centers	Intensity of infestations: Light	Moderate	Heavy	Very Heavy	All Intensities
	Number	Acres				
Snoqualmie N.F. and adjacent forest lands:						
Mountain pine beetle(W)	98	24,415	7,320	320	0	32,055
Fir engraver	1	5,480	0	0	0	5,480
Douglas-fir beetle	10	1,720	80	0	0	1,800
Engelmann spruce beetle	2	400	0	0	0	400
Western pine beetle	1	30	0	0	0	30
All insects	112	32,045	7,400	320	0	39,765
Dying hemlock	23	4,860	4,840	400	0	10,100
Bear damage	2	525	0	0	0	525
All damage	137	37,430	12,240	720	0	50,390
Southwest Washington (WSDNR):						
Western hemlock looper	14	2,710	1,300	1,660	320	5,990
Pine needle sheath miner(L)	1	0	1,440	0	0	1,440
Balsam woolly aphid	2	1,760	0	0	0	1,760
Douglas-fir beetle	3	320	0	0	0	320
All insects	20	4,790	2,740	1,660	320	9,510
Dying hemlock	10	3,840	0	0	0	3,840
Bear damage	1	800	0	0	0	800
All damage	31	9,430	2,740	1,660	320	14,150

See footnotes at end of table.

Table 25.--Extent of epidemic infestations in Washington in 1962, by forest area, insect species and intensity of infestation (Cont.)

Administrative area and insects involved 1/2/	Infestation centers	Intensity of infestations: Light	Moderate	Heavy	Very Heavy	All Intensities
	Number	Acres				
Spokane I.R.						
Oregon pine ips	2	10	0	0	0	10
All insects	2	10	0	0	0	10
Umatilla N.F. and adjacent forest lands:						
Unknown sawfly (P)	3	0	0	320	0	320
Engelmann spruce beetle	15	3,180	1,000	0	0	4,180
Fir engraver	20	1,110	2,860	20	0	3,990
Oregon pine ips	18	160	530	395	70	1,155
Douglas-fir beetle	8	160	150	15	0	325
Mountain pine beetle (P)	3	25	160	0	0	185
Mountain pine beetle (L)	1	0	0	10	0	10
Western pine beetle	2	110	0	0	0	110
All insects	70	4,745	4,700	760	70	10,275

See footnotes at end of table.

Table 25.--Extent of epidemic infestations in Washington in 1962, by forest area, insect species and intensity of infestation (Cont.)

Administrative area and insects involved 1/2/	Infestation centers	Intensity of infestations: Light	Moderate	Heavy	Very Heavy	All Intensities
	Number			Acres		
Wenatchee N.F. and adjacent forest land:						
Mountain pine beetle (W)	99	19,520	10,000	4,960	0	34,480
Mountain pine beetle (L)	2	800	0	0	0	800
Douglas-fir beetle	21	4,040	40	0	0	4,080
Fir engraver	5	680	0	0	0	680
Engelmann spruce beetle	2	40	80	0	0	120
All insects	129	25,080	10,120	4,960	0	40,160
Blowdown	2	0	0	0	120	120
All damage	131	25,080	10,120	4,960	120	40,280
Yakima I.R.:						
Balsam woolly aphid	2	360	0	0	0	360
Western pine beetle	3	2,680	0	0	0	2,680
Mountain pine beetle (P)	2	880	0	80	0	960
Mountain pine beetle (W)	2	320	0	0	0	320
Engelmann spruce beetle	1	680	0	0	0	680
Fir engraver	1	400	0	0	0	400
All insects	11	5,320	0	80	0	5,400

1/ Mountain pine beetle damage has been separated by tree species attacked: L, lodgepole pine; P, ponderosa pine; W, western white pine.

2/ Administrative areas are abbreviated as follows: NF, National Forest; I. R., Indian Reservation; N.P., National Park; W.S.D.N.R., Washington State Department of Natural Resources

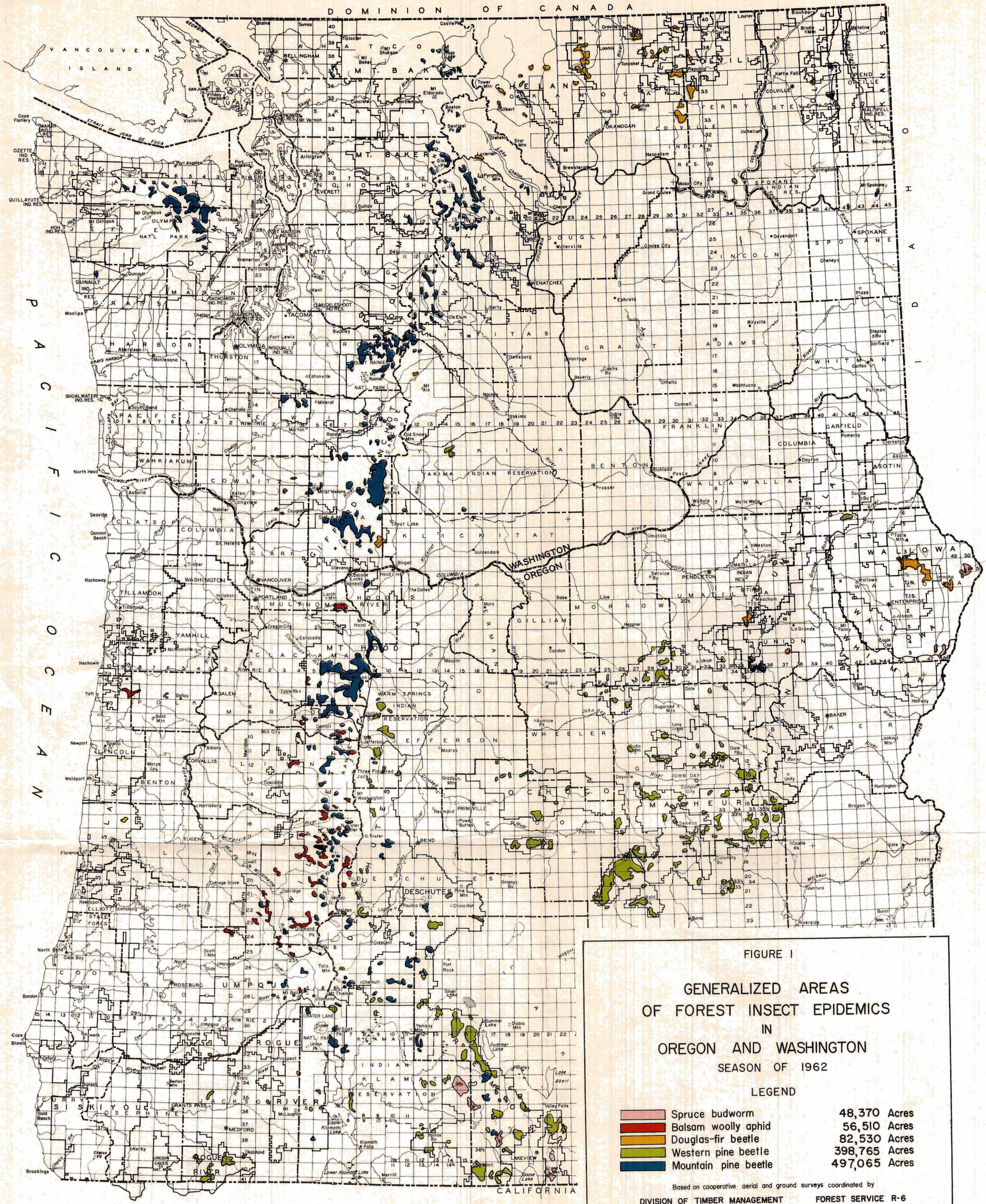

FIGURE I

GENERALIZED AREAS OF FOREST INSECT EPIDEMICS IN OREGON AND WASHINGTON

SEASON OF 1962

LEGEND

Spruce budworm	48,370 Acres
Balsam woolly aphid	56,510 Acres
Douglas-fir beetle	82,530 Acres
Western pine beetle	398,765 Acres
Mountain pine beetle	497,065 Acres

Based on cooperative aerial and ground surveys coordinated by

DIVISION OF TIMBER MANAGEMENT FOREST SERVICE R-6

U.S. DEPARTMENT OF AGRICULTURE

SCALE 10 0 10 20 30 40 MILES